BIKE SHARING SYSTEM

1.0 INTRODUCTION

According to the international research organization Global Footprint Network, humanity is consuming natural resources faster than they can be replenished—-it would take 1.7 Earths to sustain current global rates of consumption. If business as usual is continued with, this footprint will be amplified to the equivalent of three Earths by 2050, when the global population is projected to reach 9.8 billion. The global financial crisis, widening social inequalities and rapidly approaching ecological thresholds are revealing disparities in the regulatory, social and cultural systems that have driven unsustainable mass consumption for the past four decades. As a result, public trust in institutional bodies such as governments, banks, businesses, media and NGOs is in global decline (Edelman. 2018). At the same time, there is evidence that values and norms are shifting towards more mindful consumption (Gerzema, 2014). In parallel, developments in technology are enabling better, decentralised connections between supply and demand by facilitating trust between strangers (Botsman, 2018).

These developments may be seen as part of a shift towards a market system known as the ‘sharing economy’. It is based on decentralised production, consumption, finance and learning—-driven by connected individuals and communities across distributed networks (Botsman, 2018). The sharing economy has fostered innovative business models that are challenging traditional institutions of consumption and production, by selling access instead of ownership and enabling consumers to become producers themselves (Mont, 2019).

The sharing economy holds promises of economic empowerment for individuals, improved social cohesion and reduced environmental impact by decreasing demand for new products (Botsman, 2010).

However, what some consider "a greener form of capitalism" (Stokes, 2019) is regarded by others as "neoliberalism on steroids" (Murillo, 2010). Sharing organisations such as Airbnb and Uber—-which began as small, grassroots market disruptors—-have today grown into near-monopolies. They make huge profits from the value created by their users and strategically bypass laws and regulations, with little evident regard for the environment or social justice (Murillo, 2017).

The reality is probably somewhere in between. Currently, there is a lack of conceptualizations and hands-on tools to evaluate the value these organisations deliver not only for the economy and shareholders but also for the environment and society. Consequently, there is still a lack of understanding of whether business models in the sharing economy can actually deliver sustainable value (Mont, 2019).

Several studies have analyzed economic value created or destroyed by business models in the sharing economy (Cohen, 2018) but sustainability aspects are often overlooked (Bocken, 2013) and cases are often analyzed outside their organizational, institutional or geographical contexts. The first aim of this article is therefore to develop an analytical framework for Sustainable Value Creation, based on extant literature (Osterwalder, 2010) and then test it by analyzing three cases of bike sharing systems.

Bike sharing system allows users to check out bikes from public locations at key areas around town. Each location contains multiple bikes and is conveniently located for short trips near businesses, entertainment, recreation destinations, and transit.

Bike share bikes are typically available from a larger network of locations, and designed so that riders can easily rent a bike at one station and drop it off at another. While bike share can be used for recreational riding, stations are often located to connect popular destinations, employment and population centers and transit hubs. Bike share is also designed for shorter trips as most systems incentivize riders to complete their rides within 30-60 minutes, making bikes available again to new riders.

Statement of Problem

Project Scope As in today's world there is necessary to use cabs, auto for travelling purpose. But due to unavailability of cabs/autos peoples have to wait for long time. If sharing cabs are not available then it will becomes headache for peoples. So to overcome these issue, a system which will allow user to book bike on sharing bases is implemented. So this system can save user's time and money.

Aim and Objectives

Aim

The aim of this study is to develop a bike sharing system, which can be used to transport users from one place to another.

Objectives

To solve the problems stated effectively and efficiently and achieve the aim of the study, these objectives were met:

i. To identify how bike share can be of a benefit.
ii. To identify the local demand for bike share.
iii. To identify the preferred system options and technologies of the users.
iv. To identify locations with the most potential for bike share use.
v. To develop a feasible and sustainable business model.

Significant of the Study

Bike sharing gives people more convenient opportunities to get physical activity, and also boosts mental health. Bike share users report improved fitness, reduced stress, and improved mood.

Accessibility: Bike sharing can complement the transit system and give residents low-cost access to jobs and services. Because it extends the range of those without access to a car, bike share can enhance the function of the transit system, and expand the number of destinations accessible to users.

Quality of Life: More options for short trips around town means less traffic on the road and less pollution in air. Bike share also increases the visibility and popularity of cycling and active living throughout a community. Most bike share users use their own bike more after using the bike share system.

Scope of the Study

This system focuses on the development of a bike sharing system, which enables users to be transported from one location to another at their own conveniences. This system consist of web application and mobile application development for bike sharing system.

2.0 LITERATURE REVIEW

The European Commission defines bike sharing as a "self-service, short-term, one-way capable bike rental offer in public spaces, for several target groups, with network characteristics". This definition makes a clear distinction between bike sharing systems (BSS) and traditional bike rental, though it appears to relate more to large-scale public schemes rather than smaller, private bike sharing operators. Interestingly, it does not emphasize sharing. This indicates that the purpose of BSS is not primarily to optimize the use of under-utilized resources or to facilitate social interaction but rather to provide a new form of flexible mobility.

BSS have evolved since the 1960s. The first generation, known as 'free bike' systems, were regular bikes—painted in a distinct colour and distributed throughout the city, unlocked and free for public use—typically operated by environmental groups and non-profits (DeMaio, 2019). However, these systems experienced frequent theft, vandalism and confiscation by the police (Shaheen, 2010). The second generation of BSS featured secured parking and coin-deposits but the low deposit fees and user anonymity were still conducive to theft (Shaheen, 2010). The third generation of BSS, now considered state-of-the-art, is characterised by a distinguishable design (e.g., colour, construction, advertisement) and technology-enabled docking stations using smart cards, apps or Radio Frequency Identification (RFID) to identify users (Shaheen, 2010). The first example of this type of scheme was Velo'v in Lyon, France, launched in 2005 (DeMaio, 2009). Today, over 1724 cities

worldwide have bike sharing schemes, with a total of 18,243,900 bikes in use (Meddin, 2008). Fourth-generation BSS is now on the horizon: demand-responsive, multi-modal systems integrated with public transport systems, with features like electric bikes, touchscreen kiosks and GPS tracking (Shaheen, 2010). Studies on bike sharing cover environmental (Qiu,, 2018) and social aspects (Spinney, 2018), user motivations (Lan, 2017) and the impact of sharing behaviour on user innovativeness [38], the role of bike sharing in the total mobility system (Zhang, 2015) and the role of values and ethics in the adoption of bike sharing systems (Yin, 2018).

Unlike previous literature, this study applies the lens of institutionalism to a specific city context, to unveil the regulatory, normative and cognitive factors that shape the evolution of bike sharing in cities.

3.0 SYSTEM METHODOLOGY

User Experience

The bike sharing system would provide an intuitive and user-friendly experience that allows users to engage the system in multiple ways.

Users

i. Register
ii. Use the app to find the nearest bike station.

Registered Users

i. Login
ii. Update profile
iii. Book for bike

iv. Entering a unique user ID and pin via touchscreen on the bike.

v. Secure an OTP on the mobile app to unlock the bike

vi. Checking out a bike using a mobile app

vii. Checking out a bike by regenerating another OTP to lock back the bike using the app.

viii. Reaching out to the customer service if critical issues occur.

Admin

i. Login

ii. Add/update bike

iii. Delete bike

iv. Reallocation of bikes

v. Handle customer service

vi. Monitors all bikes in every location using Google map GPS

Payment Systems

In addition to providing multiple points of access, the proposed Bike sharing system would also offer multiple methods of payment, including credit card, cash and online payment.

Payment systems should provide options for online payments as well as payment made through a mobile app, and accept both credit and debit cards.

Security measures will ensure that bike share operators never directly handle customer credit card information. Security features on bikes and stations will make it difficult for unauthorized parties to access system components. Access to potentially sensitive areas would be restricted and logged to make it difficult to disable core security features.

Web Based Application

A public facing website is a key component of a successful bike sharing system.

The bike sharing web based application will provides both static information (what is bike share, how do you use it, etc.), as well as real-time maps and information on bike availability. The website provides a platform for prospective users to complete online subscriptions, purchases, renewals, and upgrades, and can include a member portal with personalized data (profile information, ride and payment history, health and environmental impact, and rankings.

Mobile App

The mobile application will be the most important point of access for riders. The mobile app makes bike share accessible and appealing to more users because it helps to remove barriers to entry. The features will include mobile app providing an easy way for new users to join and navigate a system, and provides existing members tools to find bikes, rent bikes, and interact with the bike share operators.

GPS and bike data will inform when and where bikes need to be moved to ensure bikes are available where they are needed in popular locations. As data becomes more robust and regular, geo-fenced locations and bike distribution can be adjusted to meet demand with less need for substantial, ongoing rebalancing efforts.

System Maintenance

A comprehensive system maintenance plan should be developed for the bike share system. The maintenance plan should include:

i. A fully equipped maintenance facility
ii. On-the-ground supervision during all hours the system is manned
iii. A staff team with an emphasis on cross training – allowing scheduling flexibility and efficiency in staffing
iv. A service vehicle with the capacity to transport multiple bikes
v. Unique maintenance records for each bike

Customer Service

Prompt customer service response is important to respond to any issues that might arise for users of the bike share system. Local staff should be available by phone or email during regular working hours. One of the benefits of a bike share system is that it is available twenty-four hours a day, seven days a week. During off-hour times, customers should still be able to reach customer service for critical issues. A bike share system should consider use of a customer service center that takes calls and handles issues twenty-four hours a day.

Choice of Programming Language

i. Html, css, jquery for web UI
ii. MySQL for data base
iii. React Native for the Mobile app
iv. Flutter wave for online payment
v. Laravel for the online API

System Design

The system was designed into three different independent subsystems that work together as one, these subsystems are:

i. User interface

The user interface are the part that are visible and accessible by the users of the system. The information available on the user interface is usually controlled by the backend development.

ii. Backend development

This is used to control the inputted data and the processed information to and fro the system. The backend development is the backbone of the system.

iii. Database system

Database is used to store the data entered and used by the system. The information of users is being stored and retrieved from the database.

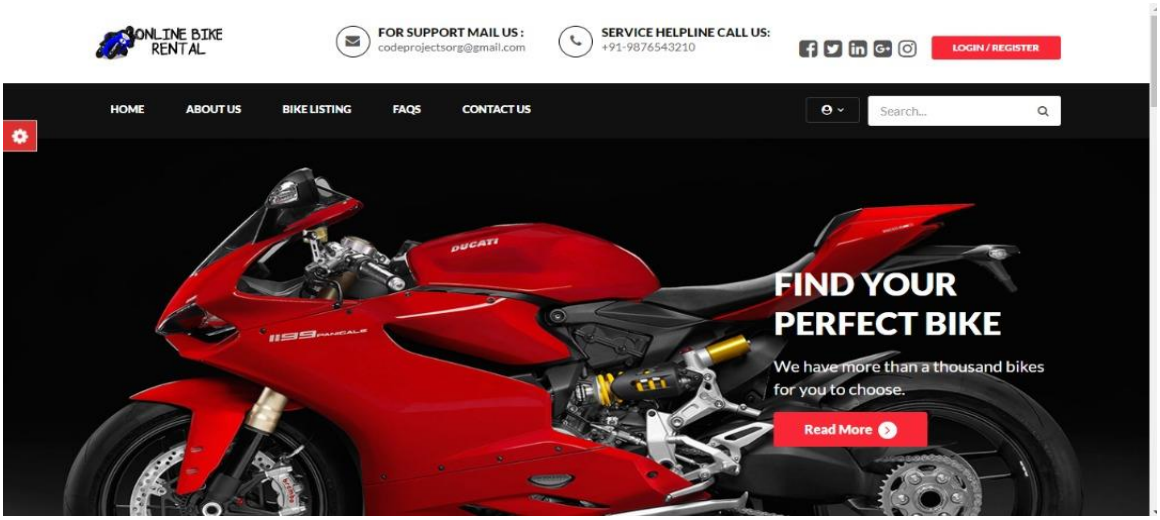


Fig. 1.0 Home Page

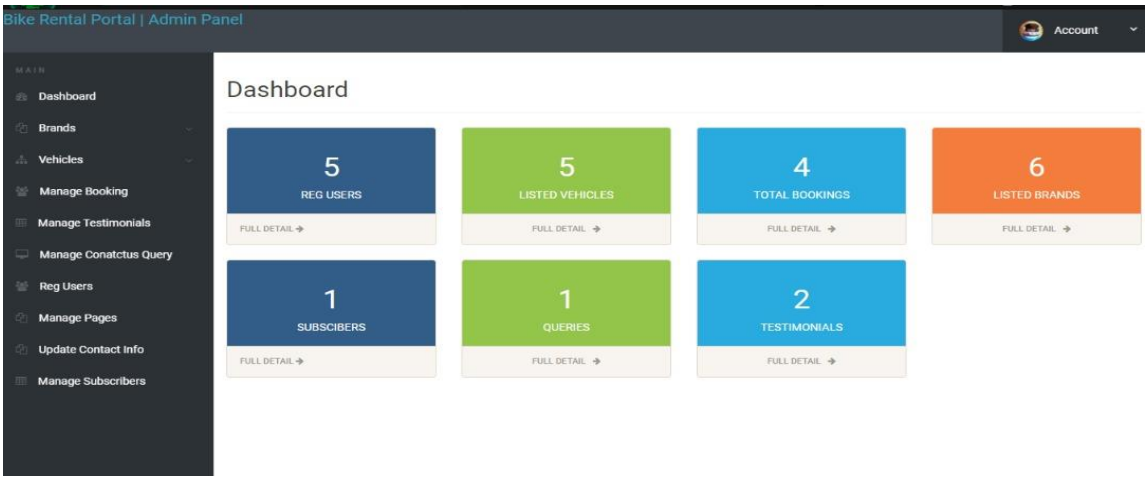
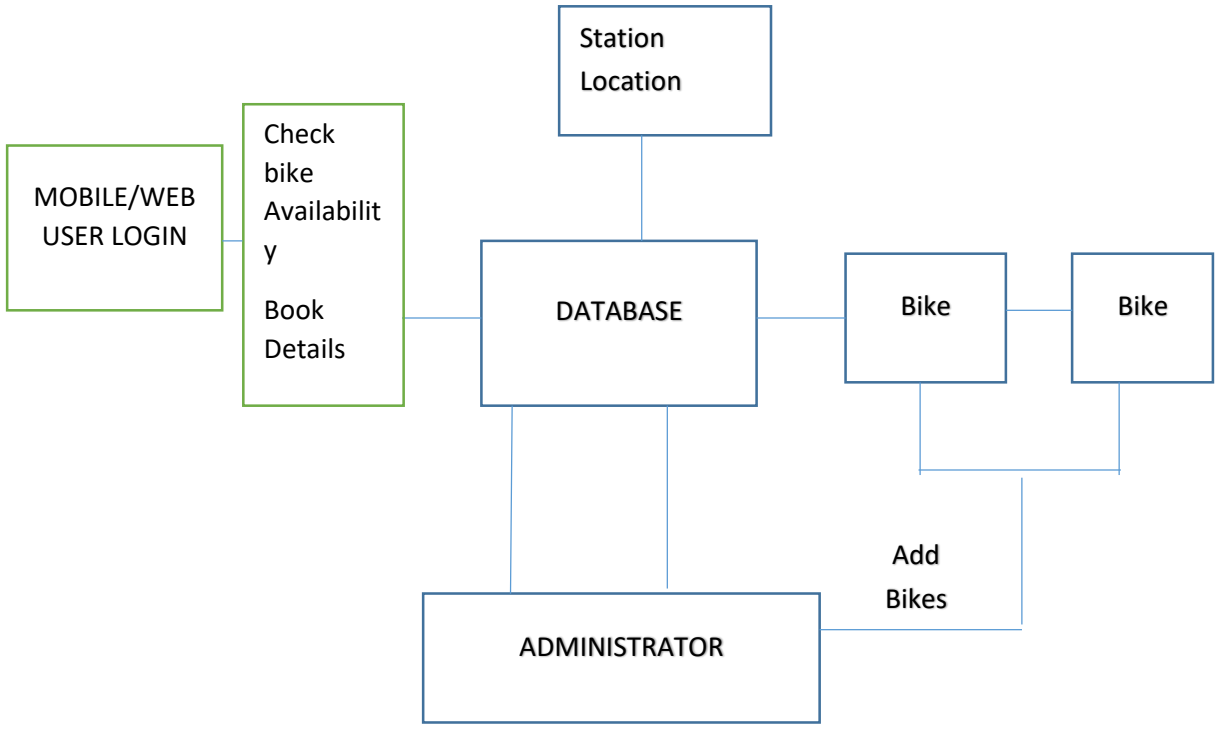


Fig. 1.1 Admin Dashboard

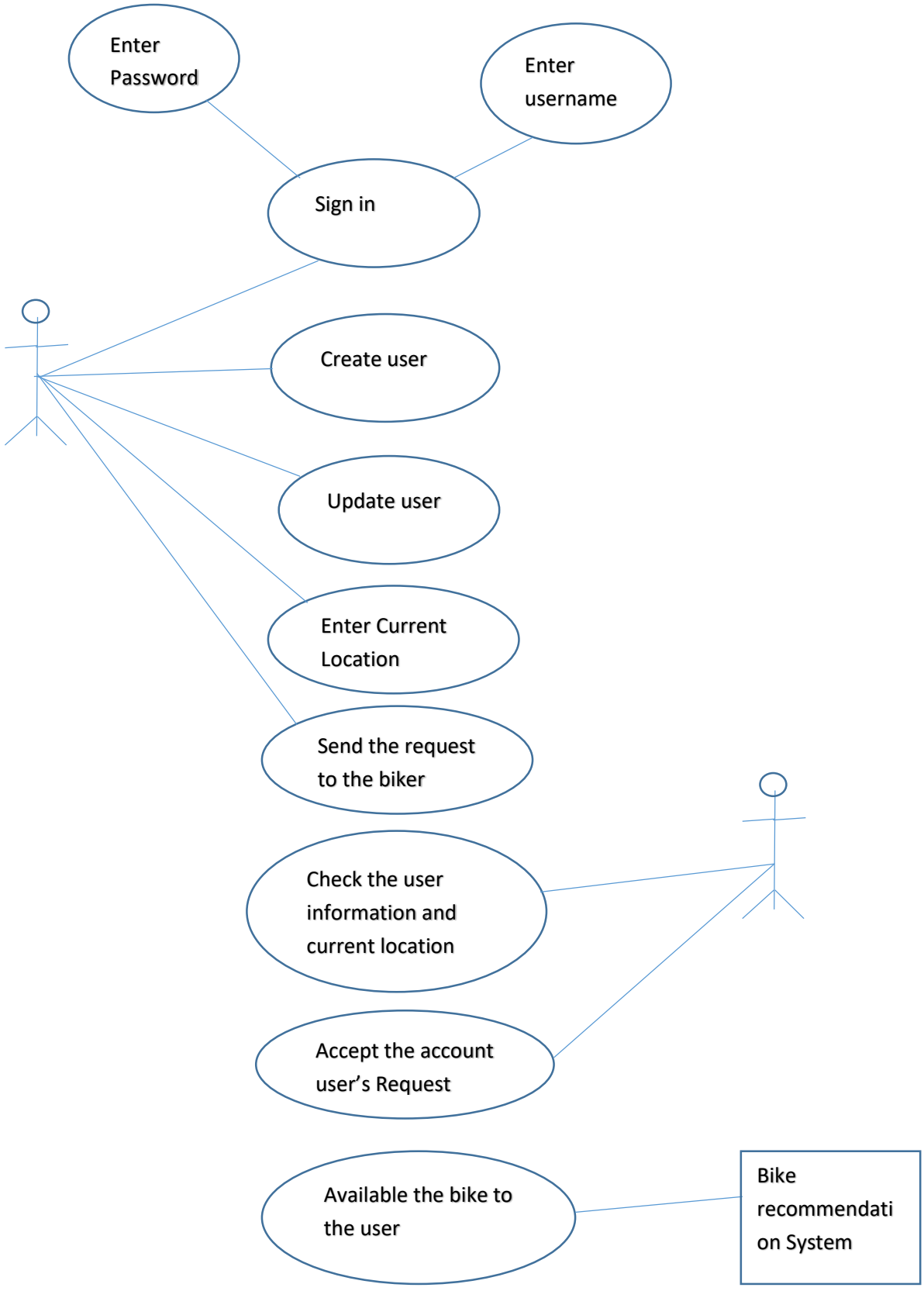
System Architecture

The system architecture is the conceptual model that defines the structure, views of bike sharing system. The architecture showed, is a formal description and representation of the bike sharing system, organized in a way that supports reasoning about the structures and behaviour of the system



System UseCase Diagram

The use case diagram depicts all the actions and tasks each users of the system can perform.



4.0 Conclusion

Bike sharing is not a new concept, it's getting more popular especially in recent years as a method to reduce the impacts of human traffic behaviors on environment, solve the problem of last mile to end a trip and provide an alternative way of travel mode. Speaking about China, although this country used to have a nickname "The Kingdom of Bicycles", the mode share of traffic for bicycles is decreasing annually. Cars, on the other hand, a symbol of rich, is becoming more popular and common.

Around the world, bike share systems have been managed by public, private, and non-profit owners and operators. In all cases, the goal of the management and financing structure is to facilitate a self-sustaining model that supports a robust program capable of growing and evolving to meet changing community needs.